F2-26
LXD-SERIES

# INSTRUCTION MANUAL

## REGULATED POWER SUPPLIES

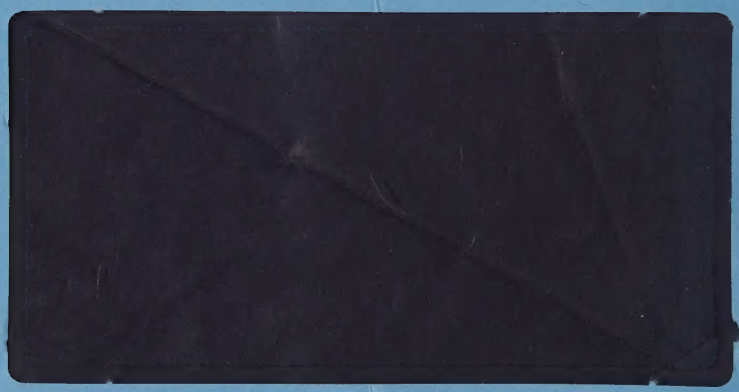
MODELS

LXD-B-062, LXD-B-152
LXD-C-062, LXD-C-152

This manual applies to units bearing serial no. prefixes A-D.

LAMBDA

LAMBDA ELECTRONICS MELVILLE, L. I., N. Y.



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This manual provides instructions intended for the operation of Lambda power supplies, and is not to be reproduced without the written consent of Lambda Electronics. All information contained herein applies to all LXD-B and LXD-C models unless otherwise specified.

LAMBDA ELECTRONICS MELVILLE, L.I., N.Y.
MAIN PLANT TELEPHONE: 516 MYrtle 4-4200

IM-LXD-B,C

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## SPECIFICATIONS AND FEATURES

D.C. OUTPUT - Voltage regulated for line and load. See table I for voltage and current ratings.

TABLE I
VOLTAGE AND CURRENT RANGES

| Models | Voltage Range (Volts) | *Maximum Current (Amps) at Ambient Temperature | | | |
|---|---|---|---|---|---|
| | | 40°C | 50°C | 60°C | 71°C |
| LXD-B-062 | ±3 | 2.1 | 2.0 | 1.6 | 1.2 |
| | ±6 | 2.7 | 2.4 | 1.9 | 1.4 |
| LXD-B-152 | ±12 | 1.4 | 1.3 | 1.1 | 0.6 |
| | ±15 | 1.6 | 1.4 | 1.2 | 0.7 |
| LXD-C-062 | ±3 | 2.6 | 2.4 | 1.9 | 1.3 |
| | ±6 | 3.5 | 3.3 | 2.7 | 1.7 |
| LXD-C-152 | ±12 | 2.0 | 1.8 | 1.5 | 1.2 |
| | ±15 | 2.5 | 2.3 | 1.9 | 1.5 |

*For current ratings at different output voltages refer to page 3.

Current range must be chosen to suit the appropriate maximum ambient temperature. Current ratings apply for entire voltage range.

REGULATED VOLTAGE OUTPUT
(each side)

Regulation.....0.1% line or load with input variations from 105-132 or 132-105 volts AC and load variations from no load to full load or full load to no load.

Ripple and Noise.....1.5 millivolts rms; 5 millivolts peak to peak.

Temperature Coefficient..Output change in voltage 0.03%/°C.

Remote Sensing.....Provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

OVERSHOOT- No overshoot under conditions of power turn-on, turn-off, or power failure.

AC INPUT - 105-132 VAC at 47-440 Hz. Ratings apply for 57-63 Hz; at 47-53 Hz input, delete 40°C current rating. For 63-440 Hz input, consult factory. For input power see table II.

TABLE II

| Model | Input Power* (watts) |
|---|---|
| LXD-B-062 | 97 |
| LXD-B-152 | 112 |
| LXD-C-062 | 121 |
| LXD-C-152 | 181 |

*With output loaded to full current rating and input voltage 132 Volts AC, 60Hz.

TRACKING - Absolute voltage difference of either negative or positive output from nominal within 2%; 0.2% change for all conditions of line, load, and temperature.

OVERLOAD PROTECTION

Thermal.....Thermostat, resets automatically when over temperature condition is eliminated.

Electrical

External.....Automatic electronic current limiting circuit, limits output current to a pre-set value less than 125% of 40°C current rating. Automatic current limiting protects the load and power supply when external overloads and direct shorts occur.

Internal.....Fuses F1 and F2 provide protection against internal circuit failure.

INPUT AND OUTPUT CONNECTIONS - Terminal block on rear of chassis.

OPERATING AMBIENT TEMPERATURE RANGE AND DUTY CYCLE - Continuous duty from 0°C to 71°C ambient.

STORAGE TEMPERATURE - (non-operating) -55°C to 85°C

V D C ADJ. CONTROL - Voltage adjust control permits adjustment of DC output

PHYSICAL DATA

Size.....LXD-B; 3-3/16" X 4-15/16" X 6-1/2"
LXD-C; 3-3/16" X 4-15/16" X 9-3/8"

Weight.....LXD-B; 7lbs. net; 8 lbs. shipping wt.
LXD-C; 10lbs. net; 11 lbs. shipping wt.

Finish.....Gray, FED. STD. 595 No. 26081.

MOUNTING - Three surfaces, each with tapped mounting holes can be utilized for mounting this unit. All LXD-B and LXD-C power supplies can be mounted with Top, Front, or Right Side facing up. Top, Front, or Right Side must be in a horizontal plane. Refer to figure 7 (or as applicable, figure 8) for mounting details.

SUFFIX "R" - All LXD-B and LXD-C power supplies with suffix "R" are fungus inert.

"V" OPTION - All LXD-B and LXD-C power supplies can be obtained for 205-265 VAC, 47-440 Hz input or 187-242 VAC, 47-440 Hz input. See nameplate for AC input rating. See schematic diagram for rewiring of AC input. Ratings apply for 57-63Hz; at 47-53Hz input, delete 40°C current rating. For 63-440Hz input, consult factory.

ACCESSORIES

Rack Adapters.....Rack adapters LRA-4, LRA-6, LRA-8, LRA-10, LRA-11, LRA-12, and LRA-13, used for ruggedized mounting with or without chassis slides are available as well as rack adapters LRA-3 and LRA-5, which are used for simple rack installations where chassis slides are not required.

Overvoltage Protector..Externally mounted, L-20-OV Series Overvoltage Protectors are available.

Metered and Non-Metered Panels.....Metered panels MP-3, MP-5 and Non-metered panels P3, P5 are available for use with Lambda rack adapters LRA-4, LRA-6, or LRA-7.

DETERMINATION OF CURRENT RATINGS AT OUTPUT VOLTAGES BETWEEN $\pm$3 and $\pm$6 OR $\pm$12 and $\pm$15 VOLTS - Current ratings vary linearly with output voltages. To determine current for any given output voltage (between rated limits) proceed as follows:

1. Determine operating ambient temperature
2. Find constants (see formula) m and c in chart below
3. Apply current formula:

$$Io = m\,Vo + c$$

where Io = output current, m=constant (see chart), c=constant (see chart) and Vo = desired output voltage; determine output current.

| MODEL | Constant m, c At Ambient Temperature | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 40° | | 50° | | 60° | | 71° | |
| | m | c | m | c | m | c | m | c |
| LXD-B-062 | 0.2 | 1.5 | 0.13 | 1.6 | 0.10 | 1.3 | 0.07 | 1.0 |
| LXD-B-152 | 0.07 | 0.6 | 0.03 | 0.9 | 0.03 | 0.7 | 0.03 | 0.2 |
| LXD-C-062 | 0.30 | 1.7 | 0.30 | 1.5 | 0.25 | 1.1 | 0.13 | 0.9 |
| LXD-C-152 | 0.17 | 0.0 | 0.17 | -0.20 | 0.13 | 0.0 | 0.10 | 0.0 |

## THEORY OF OPERATION

### GENERAL

The text in this section refers to components associated with the plus (+) side of the power supply; however, the discussion is equally applicable to the minus (-) side which has similar components, except for potentiometer R8, which is only used on the (+) side.

The Lambda power supply consists of an AC input circuit and transformer; a bias supply consisting of an auxiliary rectifier and filter, and pre-regulator*; a main regulator circuit consisting of the main rectifier and filter, a series regulator, emitter follower driver, a current comparator*, a voltage comparator*, an amplifier*, current and voltage sensing networks and a voltage reference circuit*.

*This circuit element is part of integrated circuit (IC1) in the supply.

The circuit arrangement is shown in block diagram form, figure 5. The circuitry is discussed with reference to the block diagram and the schematic diagram.

### FUNCTIONAL DESCRIPTION

Single phase input power is applied to transformer T1 through the input circuit which contains a thermostat to protect the supply against overheating.

The main rectifier, a full wave rectifier, provides the power which is filtered by capacitor C3, and then regulated via a series regulator and delivered to the output. Full-wave auxiliary rectifier CR1 and CR12 provides voltage filtered by capacitor C1 for the preregulator located in IC1. The reference element, powered by the preregulator, provides a reference voltage for the voltage comparator.

Constant voltage circuit operation is determined by changes in line or load which cause a change in one input to the voltage comparator through voltage dividers R8, R20, and R15. A second input to the comparator is a reference voltage that is developed by the preregulator in IC1. The comparator compares the output voltage change with the reference voltage resulting in an error signal at the output of the comparator.

The error signal from the comparator is then current amplified by drivers Q1 and Q2. The amplified signal from the drivers controls the voltage across series regulator Q3, which functions as the active regulating elements in the supply.

Current limit circuit operation is determined by changes in the load. The current comparator samples load current through current sensing resistor R7. When the voltage drop across R7 increases to a preset voltage reference determined by R13 and R21, the current comparator conducts. Thus, when the output current rating of the unit is exceeded, the current comparator conducts, decreasing the current

through driver Q1 and Q2, resulting in an increase of voltage across the series regulator and a decrease of the output voltage, effectively limiting the output current to a safe value. The current limit value is determined by fixed resistors R7, R21, and variable resistor R13.

When operating conditions approach short circuit, the output voltage decreases. Since the voltage determined by R13 is proportional to the output voltage, when the output voltage decreases, the amplifier is biased into turn on at lower and lower load currents until output voltage decreases to zero and current decreases to a predetermined low value.

Voltage tracking of the slave section to the master section is accomplished as follows:

When the output voltage increases, voltage across R28 and R29 also increases, causing an increase in one input to comparator located in IC2. The comparator compares this change with the output voltage reference of the slave unit resulting in an error signal at the output of the comparator. The error signal from the comparator is then current amplified by drivers Q5 and Q6. The amplified signal from the drivers controls the voltage across series regulator Q4, which functions as the active regulating element in the slave section.

## OPERATING INSTRUCTIONS

### BASIC MODE OF OPERATION

This power supply operates as a constant voltage source provided the load current does not exceed the rated value at 40°C. For continuous operation, load current must not exceed the rating for each ambient temperature. When load exceeds 125% of 40°C rating, both voltage and current decrease until voltage reaches zero and the current at short circuit equals approximately 40 percent or less of the rated current.

### CONNECTIONS FOR OPERATION

NOTE: Make all connections to the unit before applying AC input power.

Ground Connections. The Lambda power supply can be operated either with negative positive or common terminal grounded. Use insulated wire whenever positive or negative output terminals are connected to terminal 3.

Connection Terminals. Make all connections to the supply at the terminal block on the rear of the supply. Apply input power to terminals 1 and 2; always connect the ungrounded (hot) lead to terminal 1.

The supply positive terminal is brought out to terminal 7. The supply negative terminal is brought out to terminal 5. Recommended wiring of the power supply to the load and selection of wiring is shown in figures 1 through 4. Selection of proper wiring is made on the basis of load requirements. Make all performance checks and measurements of current or voltage at the rear output terminals. Connect measuring devices directly to terminals or use the shortest leads possible.

### SUPPLY LOAD CONNECTIONS

Connections For Operation as a Constant Voltage Source. The output impedance and regulation of the power supply at the load may change when using the supply as a constant voltage source and connecting leads of practical length are used. To minimize the effect of the output leads on these characteristics, remote sensing is used. Recommended types of supply-load connections with local or remote sensing are described in the following paragraphs.

Refer to figure 1 to determine voltage drop for particular cable length, wire size and current conditions. Lead lengths must be measured from supply terminals to load terminals as shown in figure 2.

Local Sensing Connection, Figure 3. The two-wire connection, with local sensing is the connection suitable for applications with relatively constant load. Any load connection combination, as shown in the figure, can be used.

Remote Sensing Connection, Figure 4. Remote sensing provides complete compensation for the DC voltage drops in the connecting cables. Sensing leads should be a twisted pair to minimize AC pick-up. A 2.5mf elect., capacitor may be required between output terminals and sense terminals to reduce noise pick-up.

FUSE SHUTDOWN

Fuses will blow when the maximum rated current value for the fuse is exceeded. Fatigue failure of fuses can occur when mechanical vibrations from the installation combine with thermally induced stresses to weaken the fuse metal. Many fuse failures are caused by a temporary condition and replacing the blown fuse will make the fuse protected circuit operative.

## MAINTENANCE

### GENERAL

This section describes trouble analysis routine, replacement procedures, calibration and test procedures that are useful for servicing the Lambda power supply. A trouble chart is provided as an aid for the troubleshooter. Refer to the section on specifications and features for the minimum performance standards.

### TROUBLE ANALYSIS

Whenever trouble occurs, systematically check fuse, primary power lines, external circuit elements, and external wiring for malfunction before trouble shooting the equipment. Failures and malfunctions often can be traced to simple causes such as improper jumper and supply-load connections or fuse failure due to metal fatigue.

Use the electrical schematic diagram and block diagram, figure 5, as an aid to locating trouble causes. The schematic diagram contains various circuit voltages that are averages for normal operation. Measure these voltages using the conditions for measurement specified on the schematic diagram. Use measuring probes carefully to avoid causing short circuits and damaging circuit components.

### CHECKING TRANSISTORS AND CAPACITORS

Check transistors with an instrument that has a highly limited current capability. Observe proper polarity to avoid error in measurement. The forward transistor resistance is low but never zero; backward resistance is always higher than the forward resistance.

For good transistors, the forward resistance for any junction is <u>always</u> greater than zero.

Do not assume trouble is eliminated when only one part is replaced. This is especially true when one transistor fails, causing other transistors to fail. Replacing only one transistor and turning power on, before checking for additional defective components could damage the replaced component.

When soldering semi-conductor devices, wherever possible, hold the lead being soldered with a pair of pliers placed between the component and the solder joint to provide an effective heat sink.

<u>NOTE</u>: The leakage resistance obtained from a simple resistance check of a capacitor is not always an indication of a faulty capacitor. In all cases the capacitors are shunted with resistances, some of which have low values. Only a dead short is a true indication of a shorted capacitor.

### PRINTED CIRCUIT BOARD MAINTENANCE TECHNIQUES

1. If foil is intact but not covered with solder it is a good contact. Do not attempt to cover with solder.

2. Voltage measurements can be made from either side of the board. Use a needlepoint probe to penetrate to the wiring whenever a protective coating is used on the wiring. A brass probe can be soldered to an alligator clip adapted to the measuring instrument.

3. Wherever possible use a heat sink when soldering transistors.

4. Broken or damaged printed wiring is usually the result of an imperfection, strain or careless soldering. To repair small breaks, tin a short piece of hook-up wire to bridge the break, and holding the wire in place, flow solder along the length of wire so that it becomes part of the circuitry.

5. When unsoldering components from the board never pry or force loose the part; unsolder the component by using the wicking process described below:

a) Select a 3/16 inch tinned copper braid for use as a wick; if braid is not available, select AWG No. 14 or No. 16 stranded wire with 1/2 inch insulation removed.

b) Dip the wick in liquid rosin flux.

c) Place the wick onto the soldered connection and apply soldering iron onto the wick.

d) When sufficient amount of solder flows onto the wick, freeing the component, simultaneously remove iron and wick.

TROUBLE CHART

The trouble chart is intended as a guide for locating trouble causes, and is used along with the schematic diagram.

The operating conditions assumed for the trouble chart are as follows:

a) AC power of proper voltage and frequency is preset at input terminals.

b) Either positive, negative, or common terminal is connected to chassis ground.

c) The power supply is connected for constant voltage with local sensing. See schematic; dotted lines indicate jumpers connected for local sensing operation.

## TROUBLE SHOOTING CHART

| Symptom | Probable Cause | Remedy |
|---|---|---|
| 1. Zero volts DC output, both sides. | Short circuit across output of supply. | Check load & load connections, correct as necessary. |
| | F1,Q1,Q2,Q3,R7, or,as applicable, R39 open | Check F1,Q2,Q3,R7, (R39) for open, replace as necessary. |
| | Shorted CR6 (as applicable) or C7. | Check CR6 & C7 for short, replace as necessary. |
| | IC1 defective. | Voltage at pin 6 must measure above rated output voltage. If reading exceeds nominal voltage rating by 3 volts or if less than output voltage rating replace IC1. |
| 2. Zero volts DC output, minus side. | F2,Q4,Q5,Q6,R11,or as applicable, R37 for open | Check F2,Q4,Q5,Q6,R11 & (R37) for open, replace as necessary. |
| | Short circuit across output of supply. | Check load & load connections,correct as necessary. |
| | Shorted CR7 or C18. | Check CR7 & C18 for short,replace as necessary. |
| | IC2 defective. | See "IC1 Defective". |
| 3. Unable to adjust output voltage. | Damaged VDC ADJ. control. | Check R8 for short and/or open, replace as necessary. |
| 4. High ripple at twice line frequency & unregulated DC output, both sides. | Q1,Q2,Q3 shorted. | Check Q1,Q2,Q3 for short, replace as necessary. |
| | Jumper between terminals 7 & 8 open. | Refer to figures 3 & 4 for proper supply terminal connections. |
| | IC1 defective. | See "Symptom 1". |

TROUBLE SHOOTING CHART

| Symptom | Probable Cause | Remedy |
|---|---|---|
| 5. High ripple at twice line frequency & unregulated DC output, minus side. | Q3,Q4, or Q5 shorted. | Check Q3,Q4,Q5 for short,replace as necessary. |
| | Jumper between terminals 4 and 5 open. | Refer to figures 3 & 4 for proper supply terminal connections. |
| | IC2 defective. | See "IC1 Defective". |
| 6. High ripple at line frequency, both sides. | Defective main rectifier plus side. | Check for open and/ or short CR2,CR3, (or as applicable CR2-CR5) |
| | C3 open. | Check C3 for open, replace as necessary. |
| 7. High ripple at line frequency, minus side. | Defective main rectifier minus side. | Check for open and/ or short CR4,CR5 (or as applicable CR24-CR27) |
| | C6 open. | Check C6 for open, replace as necessary. |
| 8. High ripple at frequency other than line or twice line frequency. | Oscillation due to defective component in filter network. | Check for open C11, C7, C17, & C18. |
| 9. Regulated high output voltage, limited voltage adjust range, both sides. | Defective IC1. | See "Symptom 1". |
| 10. Regulated high output voltage, minus side. | Defective IC2. | See "Defective IC1". |

PERFORMANCE CHECKS

Check the ripple and regulation of the power supply using the test connection diagram shown in figure 6. Use suggested test equipment or equivalent to obtain accurate results. Refer to SPECIFICATIONS AND FEATURES for minimum performance standards.

Set the differential meter, DC VTVM (John Fluke Model 801H or equivalent) to the selected power supply operating voltage. Check the power supply load regulation accuracy while switching from the load to no-load condition. Long load leads should be a twisted pair to minimize AC pick-up.

Use a Variac to vary the line voltage from 105-132 or 132-105 volts AC and check the power-supply line regulation accuracy on the VTVM differential meter.

Use a VTVM, Ballantine 320 or equivalent, to measure rms ripple voltage of the power supply DC output. Use oscilloscope to measure peak-to-peak ripple voltage of the power supply DC output.

Perform checks on both plus and minus sides of the power supply.

ADJUSTMENT OF CALIBRATION CONTROL R13, R33

Whenever Q1-Q6, R7, R11, R13, R21, R31, R33, IC1 or IC2 are replaced, and voltage and current indications do not reflect maximum ratings, adjust R13 or, as applicable, R33 as follows. The adjustment procedure requires that the power supply is removed from associated equipment, is at an ambient temperature of 25-30°C, and is stabilized and not operating.

1. Remove AC input power to the supply.

2. Unsolder wiper of R13 (or, as applicable, R33) from resistor housing and turn to full CW position.

3. Operate power supply for constant voltage with local sensing connected as shown in figure 3, with no external load.

4. Turn voltage adjust control until minimum rated output voltage is obtained.

5. Apply load so that output current is 125% of 40°C rating for the unit.

6. Using an oscilloscope, Tektronix 503 or equivalent, observe output voltage while adjusting R13 (or R33) in CCW direction. Adjust R13 (or R33) until output ripple increases sharply and oscilloscope pattern changes.

7. After adjustment is completed, remove AC power input to the supply and solder wiper of R13 (or R33) to resistor housing.

8. After soldering, check setting and repeat adjustment procedure if required.

## SERVICE

When additional instructions are required or repair service is desired, contact the nearest Lambda office where trained personnel and complete facilities are ready to assist you.

Please include the power supply model and serial number together with complete details of the problem. On receipt of this information, Lambda will supply service data or advise shipping for factory repair service.

All repairs not covered by the warranty will be billed at cost and an estimate forwarded for approval before work is started.

## PARTS ORDERING

Standard components and special components used with the Lambda power supply can be obtained from the factory. In case of emergency, critical spare parts are available through any Lambda office.

The following information must be included when ordering parts:

1. Model number and serial number of power supply and purchase date.
2. Lambda part number.
3. Description of part together with circuit designation.
4. If part is not an electronic part, or is not listed, provide a description, function, and location of the part.

# PARTS LIST

The electrical parts located on Lambda models LXD-B-062, LXD-B-152 LXD-C-062, and LXD-C-152 are listed here. Parts common to a group of models are listed first. Unique parts of individual models within the group are listed separately, by model immediately following the group common-parts listing. In addition, there is a separate listing of parts for the "V" option.

## COMMON PARTS
## MODELS LXD-B-062 AND LXD-B-152

| CIRC. DESIG. | DESCRIPTION | LAMBDA NO. |
|---|---|---|
| C1 | Cap., elect., 40 mf -7.5 +87.4%, 35 vdc | CBP-40-014 |
| C2, C8, C9 | Not assigned | |
| C10 | Cap., mylar, 0.033 mf ±10%, 400 vdc | CGL-33-009 |
| C12, C13 | Not assigned | |
| C15† | Cap., tant., 2.5 mf -15 +75%, 100 vdc | CBN-25-010 |
| C16 | Same as C1 | |
| C19† | Same as C15 | |
| C22 thru C24 | Not assigned | |
| C26 | Not assigned | |
| C27,† C28† | Cap., mylar, 0.001 mf ±10%, 200 vdc | CGK-10-004 |
| CR1 | Rectifier | FBL-00-030 |
| CR2 thru CR5 | Rectifier | FBL-00-092 |
| CR8 thru CR10 | Not assigned | |
| CR12 | Same as CR1 | |
| CR13 thru CR20 | Not assigned | |
| CR21, CR23 | Same as CR1 | |
| IC1,** IC2** | Integrated circuit | FBT-00-016 |
| IC1, IC2 | Integrated circuit | FBT-00-071 |
| Q1,† Q2 | Transistor, NPN | FBN-L113 |
| Q3,† Q4† | Transistor, NPN | FBN-L169 |
| Q5, Q6† | Same as Q1 | |
| R2 | Res., comp., 220 ohms ±10%, ¼ w | DCB-2211 |
| R3 | Res., comp., 10,000 ohms ±10%, 1 w | DGB-1031 |
| R5 | Res., comp., 1,200 ohms ±10%, ¼ w | DCB-1221 |
| R6 | Res., comp., 47,000 ohms ±10%, ¼ w | DCB-4731 |
| R8 | Res., var., cermet or ww, 1,000 ohms ±10%, ¾ w | DNS-10-108 |
| R10, R12 | Not assigned | |
| R13 | Res., var., ww, 1,200 ohms ±10%, 1½ w | DNS-12-026 |

## COMMON PARTS (Cont.)
## MODELS LXD-B-062 AND LXD-B-152 (Cont.)

| CIRC. DESIG. | DESCRIPTION | LAMBDA NO. |
|---|---|---|
| R14 | Not assigned | |
| R16† | Res., comp., 22 ohms ±10%, ½ w | DEB-2201 |
| R17 thru R19, R23 | Not assigned | |
| R25 | Same as R5 | |
| R26† | Same as R16 | |
| R27 | Same as R3 | |
| R30 | Same as R6 | |
| R32 | Same as R2 | |
| R33 | Same as R13 | |
| R34, R40 | Not assigned | |
| R41,† R42† | Res., comp., 220 ohms ±10%, ¼ w | DCB-2211 |
| R43* | Res., comp., 1,000 ohms ±10%, ¼ w | DCB-1021 |
| R44 thru R51 | Not assigned | |
| R52,† R53† | Res., comp., 470 ohms ±10%, ¼ w | DCB-4711 |
| S1 | Thermostat | FKA-124-013 |

* R43 not used on units with serial no. prefix A.

† On units with serial no. prefixed A & B: C15, C19 are Cap., mylar, 0.1 mf ±10%, 200 vdc, CAM-10-012; Q3, Q4 are FBN-36485; R16, R26 are 470 ohms, ¼ w, DCB-4711; R41, R42 are 2,200 ohms, DCB-2221; C27, C28, R52, R53 are not used. Q1, Q6 are only used on these units.

** Only used on units with serial no. prefixes A through C.

## UNIQUE PARTS
## MODEL LXD-B-062

| | | |
|---|---|---|
| C3 | Cap., elect., 7,500 mf -10 +100%, 15 vdc | CBS-75-077 |
| C4 | Cap., mylar, 0.1 mf ±10%, 80 vdc | CGM-10-006 |
| C5 | Not assigned | |
| C6 | Same as C3 | |
| C7 | Cap., elect., 290 mf -10 +100%, 20 vdc | CBR-29-061 |
| C11 | Cap., mylar, 0.0068 mf ±10%, 200 vdc | CGK-68-001 |
| C14 | Same as C4 | |
| C17 | Same as C11 | |
| C18 | Sames a C7 | |
| C20, C21 | Same as C4 | |
| C25 | Not assigned | |

UNIQUE PARTS (Cont.)
MODEL LXD-B-062 (Cont.)

| CIRC. DESIG. | DESCRIPTION | LAMBDA NO. |
|---|---|---|
| CR6. | Rectifier | FBL-00-092 |
| CR7 | | |
| CR11, CR22 | Not assigned | |
| F1, F2 | Fuse, 10 ampere | FFM-10-000 |
| R1 | Res., film, 4,990 ohms ±1%, ¼ w | DCS-50-063 |
| R4 | Res., comp., 2,200 ohms ±10%, ½ w | DEB-2221 |
| R7* | Res., ww, 0.39 ohm ±5%, 5 w | DFM-39-046 |
| R9 | Res., film, 2,490 ohms ±1%, ½ w | DCS-25-037 |
| R11* | Same as R7 | |
| R15 | Res., film, 499 ohms ±1%, ½ w | DCR-50-029 |
| R20 | Not assigned | |
| R21 | Res., film, 3,600 ohms ±5%, ¼ w | DCS-36-080 |
| R22 | Res., comp., 2,200 ohms ±10%, ¼ w | DCB-221 |
| R24 | Same as R4 | |
| R28, R29 | Res., film, 1,050 ohms ±½%, ¼ w | DCS-10-088 |
| R31 | Same as R21 | |
| R35 | Not assigned | |
| R36 | Res., comp., 1,000 ohms ±10%, ¼ w | DCB-1021 |
| R37* | Res., ww, 0.75 ohm ±5%, 5 w | DFM-75-044 |
| R38 | Same as R22 | |
| R39* | Same as R37 | |
| T1 | Transformer | ABA-LXDB-062 |

* On units with serial no. prefixes A & B: R7, R11 are 0.75 ohm, DFM-75-044. R37, R39 are only used on these units.

MODEL LXD-B-152

| | | |
|---|---|---|
| C3 | Cap., elect., 2,100 mf -10 +100%, 35 vdc | CBS-21-043 |
| C4 | Not assigned | |
| C5 | Cap., mylar, 0.1 mf ±10%, 200 vdc | CAM-10-012 |
| C6 | Same as C3 | |
| C7 | Cap., elect., 190 mf -10 +100%, 30 vdc | CBR-19-067 |
| C11 | Cap., mylar, 0.0033 mf ±10%, 200 vdc | CGK-33-003 |
| C14 | Not assigned | |
| C17 | Same as C11 | |
| C18 | Same as C7 | |
| C20, C21 | Not assigned | |
| C25 | Same as C5 | |
| CR6, CR7 | Rectifier | FBL-00-063 |
| CR11, CR22 | Rectifier | FBL-00-030 |
| CR24 thru CR27 | Rectifier | FBL-00-092 |
| F1, F2 | Fuse, 5 ampere | FFM-05-000 |
| R1* | Res., comp., 1,000 ohms ±10%, ½ w | DEB-1021 |
| R1 | Res., film, 221 ohms ±1%, ¼ w | DCR-22-065 |
| R4 | Res., comp., 8,200 ohms ±10%, ½ w | DEB-8221 |
| R7 | Res., ww, 0.3 ohm ±5%, 3 w | DFM-30-053 |
| R9 | Not assigned | |
| R11 | Same as R7 | |

UNIQUE PARTS (Cont.)
MODEL LXD-B-152 (Cont.)

| CIRC. DESIG. | DESCRIPTION | LAMBDA NO. |
|---|---|---|
| R15* | Res., film, 825 ohms ±1%, ¼ w | DCR-82-053 |
| R15 | Res., film, 348 ohms ±1%, ¼ w | DCR-35-051 |
| R20* | Res., film, 249 ohms ±1%, ¼ w | DCR-25-034 |
| R20 | Res., film, 1,000 ohms ±1%, ¼ w | DCS-10-055 |
| R21 | Res., film, 15,000 ohms ±5%, ¼ w | DCT-15-062 |
| R22 | Res., comp., 100 ohms ±10%, ¼ w | DCB-1011 |
| R24 | Same as R4 | |
| R28* | Res., film, 8,870 ohms ±½%, ¼ w | DCS-89-090 |
| R28 | Res., film, 9,090 ohms ±1%, ¼ w | DCS-91-054 |
| R29* | Res., film, 2,550 ohms ±½%, ¼ w | DCS-25-089 |
| R29 | Res., film, 887 ohms ±0.5%, ¼ w | DCR-89-094 |
| R31 | Same as R21 | |
| R35* | Same as R29 | |
| R35 | Same as R29 | |
| R36* | Res., film, 3,160 ohms ±½%, ¼ w | DCS-32-082 |
| R36 | Res., film, 4,110 ohms ±0.5%, ¼ w | DCS-41-109 |
| R37 | Not assigned | |
| R38 | Same as R22 | |
| R39 | Not assigned | |
| T1 | Transformer | ABA-LXDB-152 |

* Only used on units with serial no. prefixes A through C.

COMMON PARTS
MODELS LXD-C-062 AND LXD-C-152

| | | |
|---|---|---|
| C1 | Cap., elect., 40 mf -7.5 +87.5%, 35 vdc | CBP-40-014 |
| C2 | Not assigned | |
| C4 | Cap., mylar, 0.1 mf ±10%, 80 vdc | CGM-10-006 |
| C5, C8, C9 | Not assigned | |
| C10 | Cap., mylar, 0.033 mf ±10%, 400 vdc | CGL-33-009 |
| C12, C13 | Not assigned | |
| C14 | Same as C4 | |
| C15† | Cap., tant., 2.5 mf -15 +75%, 100 vdc | CBN-25-010 |
| C16 | Same as C1 | |
| C19† | Same as C15 | |
| C20, C21 | Same as C4 | |
| C22 thru C26 | Not assigned | |
| C27,† C28† | Cap., mylar, 0.001 mf ±10%, 200 vdc | CGK-10-004 |
| CR1 | Rectifier | FBL-00-030 |
| CR2 thru CR7 | Rectifier | FBL-00-054 |
| CR8 thru CR10 | Not assigned | |
| CR12 | Same as CR1 | |
| CR13 thru CR20 | Not assigned | |
| CR21, CR23 | Same as CR1 | |
| F1, F2 | Fuse, 10 amp., 8 AG, NORM-BLO | FFR-10-000 |

## COMMON PARTS (Cont.)
## MODELS LXD-C-062 AND LXD-C-152 (Cont.)

| CIRC. DESIG. | DESCRIPTION | LAMBDA NO. |
|---|---|---|
| IC1,** IC2** | Integrated circuit | FBT-00-016 |
| IC1, IC2 | Integrated circuit | FBT-00-071 |
| Q1,† Q2 | Transistor, NPN | FBN-L113 |
| Q3,† Q4† | Transistor, NPN | FBN-L169 |
| Q5, Q6† | Same as Q1 | |
| R2 | Res., comp., 220 ohms ±10%, ¼ w | DCB-2211 |
| R3 | Res., comp., 3,300 ohms ±5%, 1 w | DGB-3325 |
| R5† | Res., comp., 4,700 ohms ±10%, ¼ w | DCB-4721 |
| R6 | Res., comp., 47,000 ohms ±10%, ¼ w | DCB-4731 |
| R8 | Res., var., cermet or ww, 1,000 ohms ±10%, ¾ w | DNS-10-108 |
| R10, R12 | Not assigned | |
| R13 | Res., var., ww, 1,200 ohms ±10%, 1½ w | DNS-12-026 |
| R14 | Not assigned | |
| R16† | Res., comp., 22 ohms ±10%, ½ w | DEB-2201 |
| R17 thru[ R19, R23 | Not assigned | |
| R25† | Same as R5 | |
| R26† | Same as R16 | |
| R27 | Smae as R3 | |
| R30 | Same as R6 | |
| R32 | Same as R2 | |
| R33 | Same as R13 | |
| R34, R40 | Not assigned | |
| R41,† R42† | Res., comp., 220 ohms ±10%, ¼ w | DCB-2211 |
| R43* | Res., comp., 1,000 ohms ±10%, ¼ w | DCB-1021 |
| R44 thru R49 | Not assigned | |
| R52,† R53† | Res., comp., 470 ohms ±10%, ¼ w | DCB-4711 |
| XF1, XF2 | Fuseholder | HRM-00-016 |

* R43 not used on units with serial no. prefix A.

† On units with serial no. prefixes A & B: C15, C19 are Cap., mylar, 0.1 mf ±10%, 200 vdc, CAM-10-012; Q3, Q4 are FBN-36485; R5, R25 are 1,200 ohms, DCB-1221; R16, R26 are 470 ohms ¼ w, DCB-4711; R41, R42 are 2,200 ohms, DCB-2221; C27, C28, R52, R53 are not used. Q1, Q6 are only used on these units.

** Only used on units with serial no. prefixes A through C.

## UNIQUE PARTS
## MODEL LXD-C-062

| CIRC. DESIG. | DESCRIPTION | LAMBDA NO. |
|---|---|---|
| C3, C6 | Cap., elect., 7,500 mf -10 +100%, 15 vdc | CBS-75-077 |
| C7 | Cap., elect., 450 mf -10 +100%, 25 vdc | CBR-45-075 |
| C11,* C17* | Cap., mylar, 0.0033 mf ±10%, 200 vdc | CGK-33-003 |
| C18 | Same as C7 | |
| CR11 | Not assigned | |
| CR22 | Not assigned | |
| R1 | Res., film, 4,990 ohms ±1%, ¼ w | DCS-50-063 |
| R4 | Res., comp., 2,700 ohms ±10%, ½ w | DEB-2721 |
| R7 | Res., ww, 0.56 ohm ±5%, 5 w | DFM-56-047 |
| R9 | Res., film, 2,490 ohms ±1%, ½ w | DCS-25-037 |
| R11 | Same as R7 | |
| R15 | Res., film, 499 ohms ±1%, ½ w | DCR-50-029 |
| R20 | Not assigned | |
| R21* | Res., film, 4,990 ohms ±1%, ¼ w | DCS-50-063 |
| R22 | Res., comp., 2,200 ohms ±10%, ¼ w | DCB-2221 |
| R24 | Same as R4 | |
| R28, R29 | Res., film, 1,050 ohms ±½%, ¼ w | DCS-10-088 |
| R31* | Same as R21 | |
| R35 | Not assigned | |
| R36 | Res., comp., 1,000 ohms ±10%, ¼ w | DCB-1021 |
| R37 | Same as R7 | |
| R38 | Same as R22 | |
| R39 | Same as R7 | |
| R50,* R51* | Res., comp., 1,000 ohms ±10%, ¼ w | DCB-1021 |
| S1 | Thermostat | FKA-124-013 |
| T2 | Transformer | ABA-LXDC-062 |

* On units with serial no. prefixes A & B: C11, C17 are 0.0047 mf, CGK-47-002; R21, R31 are 3,600 ohms ±5%, DCS-36-080; R50, R51 are not used.

## MODEL LXD-C-152

| | | |
|---|---|---|
| C3, C6 | Cap., elect., 2,500 mf -10 +100%, 40 vdc | CBS-25-075 |
| C7 | Cap., elect., 280 mf -10 +100%, 40 vdc | CBR-28-074 |
| C11, C17 | Cap., mylar, 0.0033 mf ±10%, 200 vdc | CGK-33-003 |
| C18 | Same as C7 | |
| CR11, CR22 | Rectifier | FBL-00-030 |
| R1* | Res., comp., 1,000 ohms ±10%, ½ w | DEB-1021 |
| R1 | Res., film, 221 ohms ±1%, ¼ w | DCR-22-005 |
| R4 | Res., comp., 10,000 ohms ±10%, ½ w | DEB-1031 |
| R7 | Res., ww, 0.21 ohm ±5%, 5 w | DFM-21-072 |
| R9 | Not assigned | |
| R11 | Same as R7 | |
| R15* | Res., film, 825 ohms ±1%, ¼ w | DCR-82-053 |

* Only used on units with serial no. prefixes A through C.

## UNIQUE PARTS (Cont.)
## MODEL LXD-C-152 (Cont.)

| CIRC. DESIG. | DESCRIPTION | LAMBDA NO. |
|---|---|---|
| R15 | Res., film, 348 ohms ±1%, ¼ w | DCR-35-051 |
| R20* | Res., film, 249 ohms ±1%, ¼ w | DCR-25-034 |
| R20 | Res., film, 1,000 ohms ±1%, ¼ w | DCS-10-055 |
| R21 | Res., film, 15,000 ohms ±5%, ¼ w | DCT-15-062 |
| R22 | Res., comp., 100 ohms ±10%, ¼ w | DCB-1011 |
| R24 | Same as R4 | |
| R28* | Res., film, 8,870 ohms ±5% ¼ w | DCS-89-090 |
| R28 | Res., film, 9,090 ohms ±1%, ¼ w | DCS-91-054 |
| R29* | Res., film, 2,550 ohms ±½%, ¼ w | DCS-25-089 |
| R29 | Res., film, 887 ohms ±0.5%, ¼ w | DCR-89-094 |
| R31 | Same as R21 | |
| R35* | Same as R29 | |
| R35 | Same as R29 | |
| R36* | Res., film, 3,160 ohms ±½%, ¼ w | DCS-32-082 |
| R36 | Res., film, 4,110 ohms ±0.5%, ¼ w | DCS-41-109 |
| R37 | Not assigned | |
| R38 | Same as R22 | |
| R39, R50, R51 | Not assigned | |
| S1 | Thermostat | FKA-137-014 |
| T1 | Transformer | ABA-LXDC-152 |

* Only used on units with serial no. prefixes A through C.

## PARTS FOR "V" OPTION

On all LXD-B and LXD-C models with suffix "V" capacitor C10 and transformer T1 change. Part no. change for C10 is listed here. For transformer T1 used on these models, see standard LXD-B or LXD-C parts list for the standard transformer part no., and add suffix "G"* to the part no.

* Suffix "V" on units with serial no. prefix A.

## ALL MODELS

| | | |
|---|---|---|
| C10 | Cap., paper, 0.01 mf ±10%, 1,000 vdc | CAL-10-021 |

## PARTS FOR METERED AND NON-METERED PANEL ACCESSORIES
## MODELS MP-3, MP-5, P-3, P-5

| CIRC. DESIG. | DESCRIPTION | LAMBDA NO. |
|---|---|---|
| C1, C2 | Cap., tant., 2.5 mf -15 +75%, 100 vdc (ALL) | CBN-25-010 |
| DS1 | Pilot light assembly (ALL) | HRD-00-007 |
| F1 | Fuse, 3A, 3 AG, SLO-BLO (LXD-B-062, LXD-B-152) | FFC-03-000 |
| F1 | Fuse, 5 A, 3 AG, SLO-BLO (LXD-C-062, LXD-C-152) | FFC-05-000 |
| M1* | Voltmeter, 0-15 vdc (LXD-B-062, LXD-C-062) | EBP-15-017 |
| M1* | Voltmeter, 0-40 vdc (LXD-B-152, LXD-C-152) | EBP-40-013 |
| M2* | Ammeter, 0-5 adc (LXD-B-062, LXD-C-062, LXD-C-152) | EDN-50-021 |
| M2* | Ammeter, 0-3 adc (LXD-B-152) | EDN-30-019 |
| S1** | Switch SPST (ALL) | FDA-11-001 |
| S1† | Switch, SPST (ALL) | FDA-11-040 |
| XF1 | Fusdholder (ALL) | HRK-00-007 |

* This part only used on MP-3, MP-5.
** This part only used on MP-3, P-3.
† This part only used on MP-5, P-5.

## PARTS FOR METERED AND NON-METERED PANEL ACCESSORIES WITH "V" OPTION

On all metered and non-metered panels with suffix "V", fuse F1 changes and a resistor is added in series with pilot light DS1. Part nos. for F1 and DS1-Res. are listed here.

| | | |
|---|---|---|
| F1 | Fuse, 1.5A, 3 AG, SLO-BLO (LXD-B-062, LXD-B-152) | FFC-01-500 |
| F1 | Fuse, 2A, 3 AG, SLO-BLO (LXD-C-062, LXD-C-152) | FFC-02-000 |
| DS1 Res | Res., comp., 120,000 ohms ±10%, ½ w | DEB-1241 |

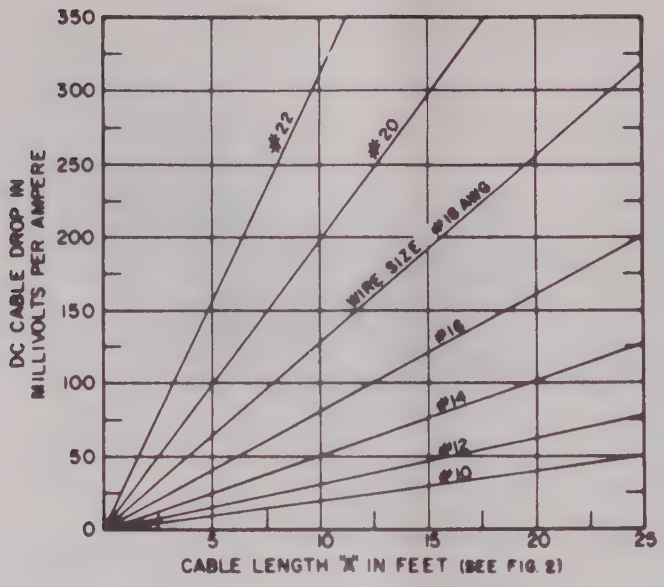



Figure 1. Cable Connection Chart

Figure 2. Cable Length "A" in Feet

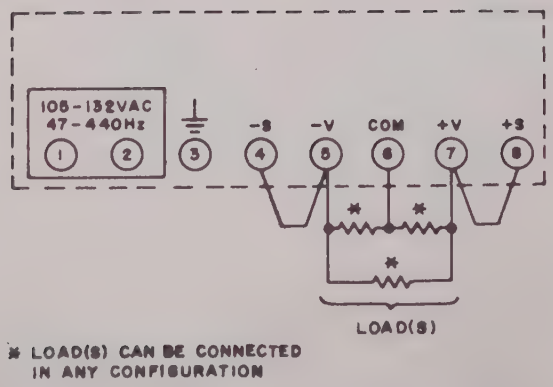



Figure 3. Local Sensing Connection

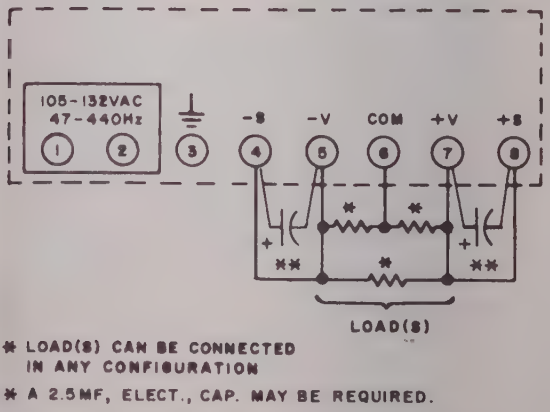



Figure 4. Remote Sensing Connection

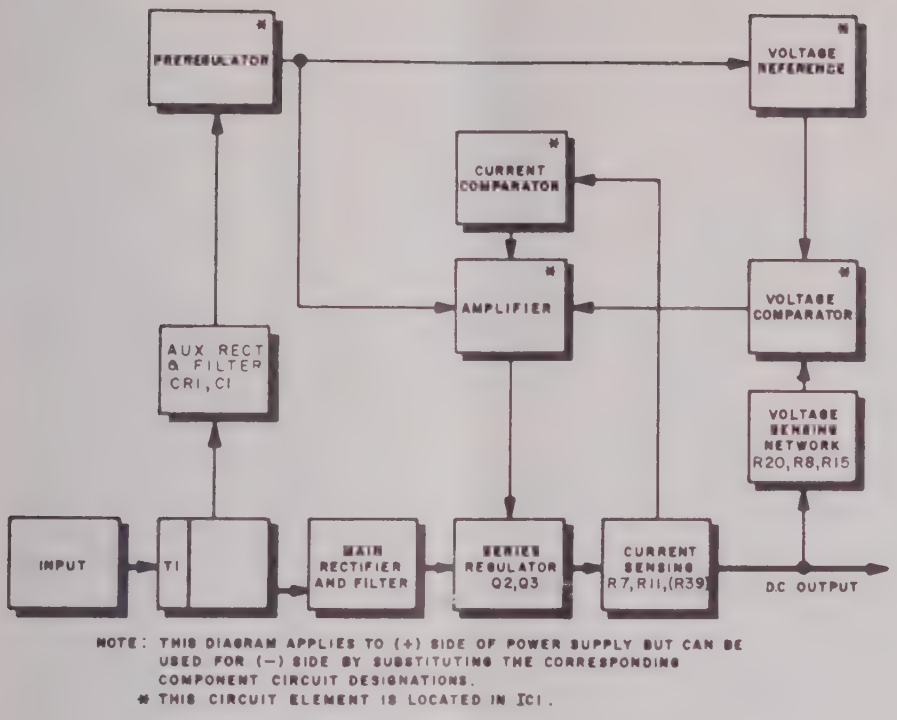

PREREGULATOR *
VOLTAGE REFERENCE *
CURRENT COMPARATOR *
AMPLIFIER *
VOLTAGE COMPARATOR *
AUX RECT & FILTER CR1, C1
VOLTAGE SENSING NETWORK R20, R8, R15
INPUT
T1
MAIN RECTIFIER AND FILTER
SERIES REGULATOR Q2, Q3
CURRENT SENSING R7, R11, (R39)
D.C. OUTPUT
NOTE: THIS DIAGRAM APPLIES TO (+) SIDE OF POWER SUPPLY BUT CAN BE USED FOR (−) SIDE BY SUBSTITUTING THE CORRESPONDING COMPONENT CIRCUIT DESIGNATIONS.
* THIS CIRCUIT ELEMENT IS LOCATED IN IC1.

Figure 5. Block Diagram

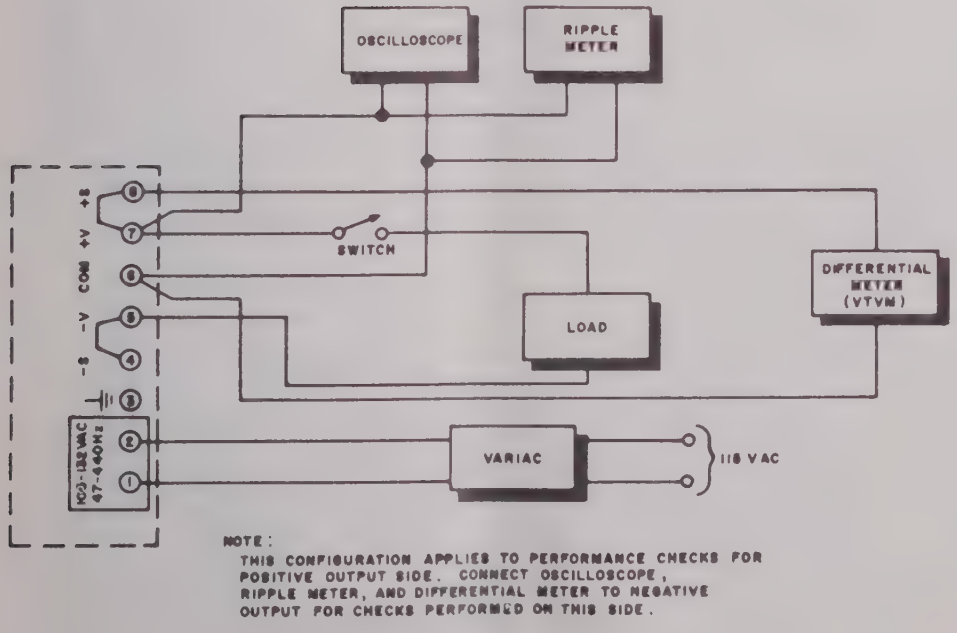



Figure 6. Test Connections For Performance Checks

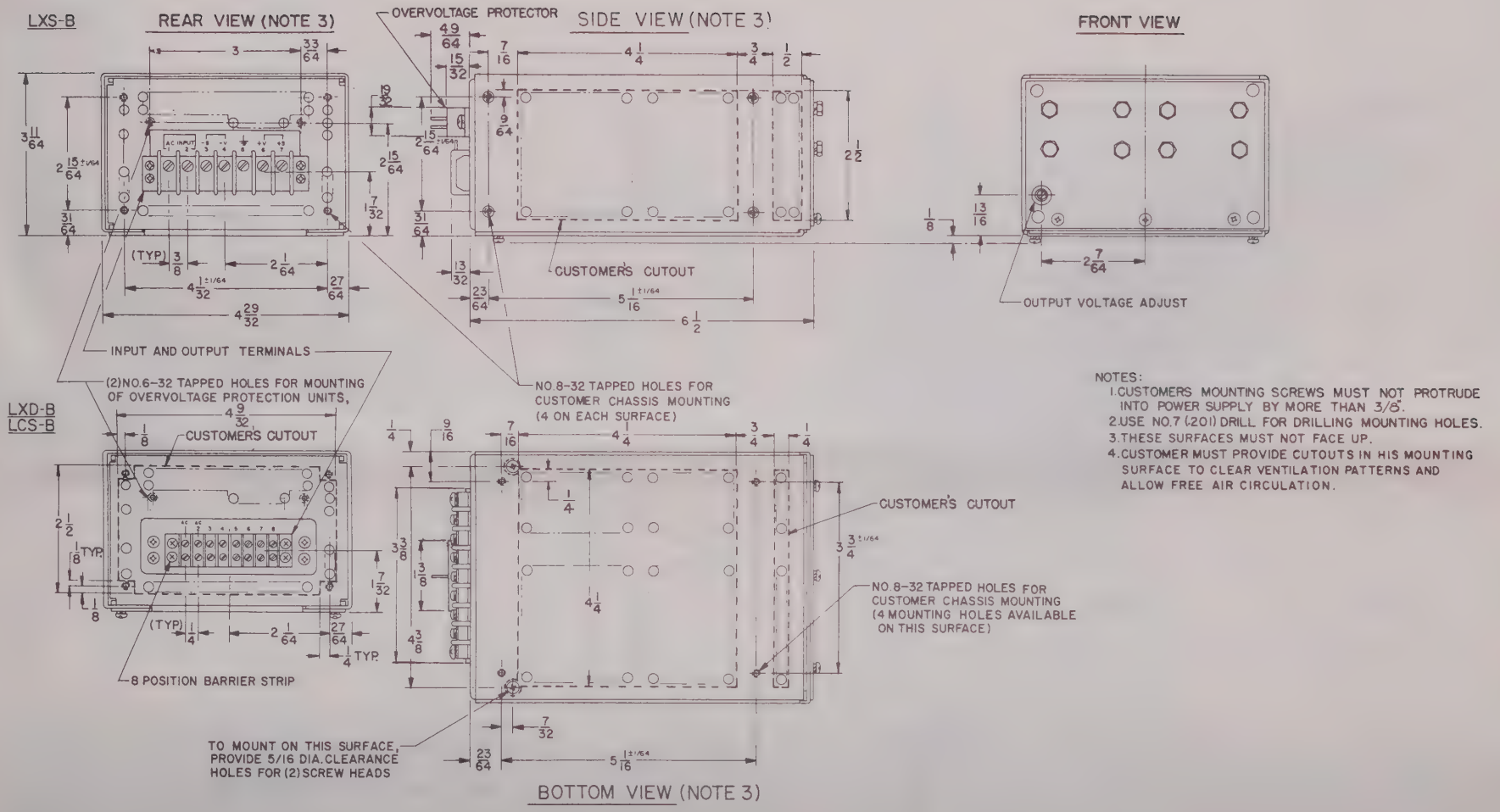

LXS-B
REAR VIEW (NOTE 3)
OVERVOLTAGE PROTECTOR
SIDE VIEW (NOTE 3)
FRONT VIEW
CUSTOMER'S CUTOUT
OUTPUT VOLTAGE ADJUST
INPUT AND OUTPUT TERMINALS
(2) NO.6-32 TAPPED HOLES FOR MOUNTING OF OVERVOLTAGE PROTECTION UNITS,
NO.8-32 TAPPED HOLES FOR CUSTOMER CHASSIS MOUNTING (4 ON EACH SURFACE)
LXD-B
LCS-B
CUSTOMER'S CUTOUT
8 POSITION BARRIER STRIP
CUSTOMER'S CUTOUT
NO.8-32 TAPPED HOLES FOR CUSTOMER CHASSIS MOUNTING (4 MOUNTING HOLES AVAILABLE ON THIS SURFACE)
TO MOUNT ON THIS SURFACE, PROVIDE 5/16 DIA. CLEARANCE HOLES FOR (2) SCREW HEADS
BOTTOM VIEW (NOTE 3)
NOTES:
1. CUSTOMERS MOUNTING SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 3/8".
2. USE NO.7 (.201) DRILL FOR DRILLING MOUNTING HOLES.
3. THESE SURFACES MUST NOT FACE UP.
4. CUSTOMER MUST PROVIDE CUTOUTS IN HIS MOUNTING SURFACE TO CLEAR VENTILATION PATTERNS AND ALLOW FREE AIR CIRCULATION.

Figure 7. Typical Outline Drawing, LXD-B

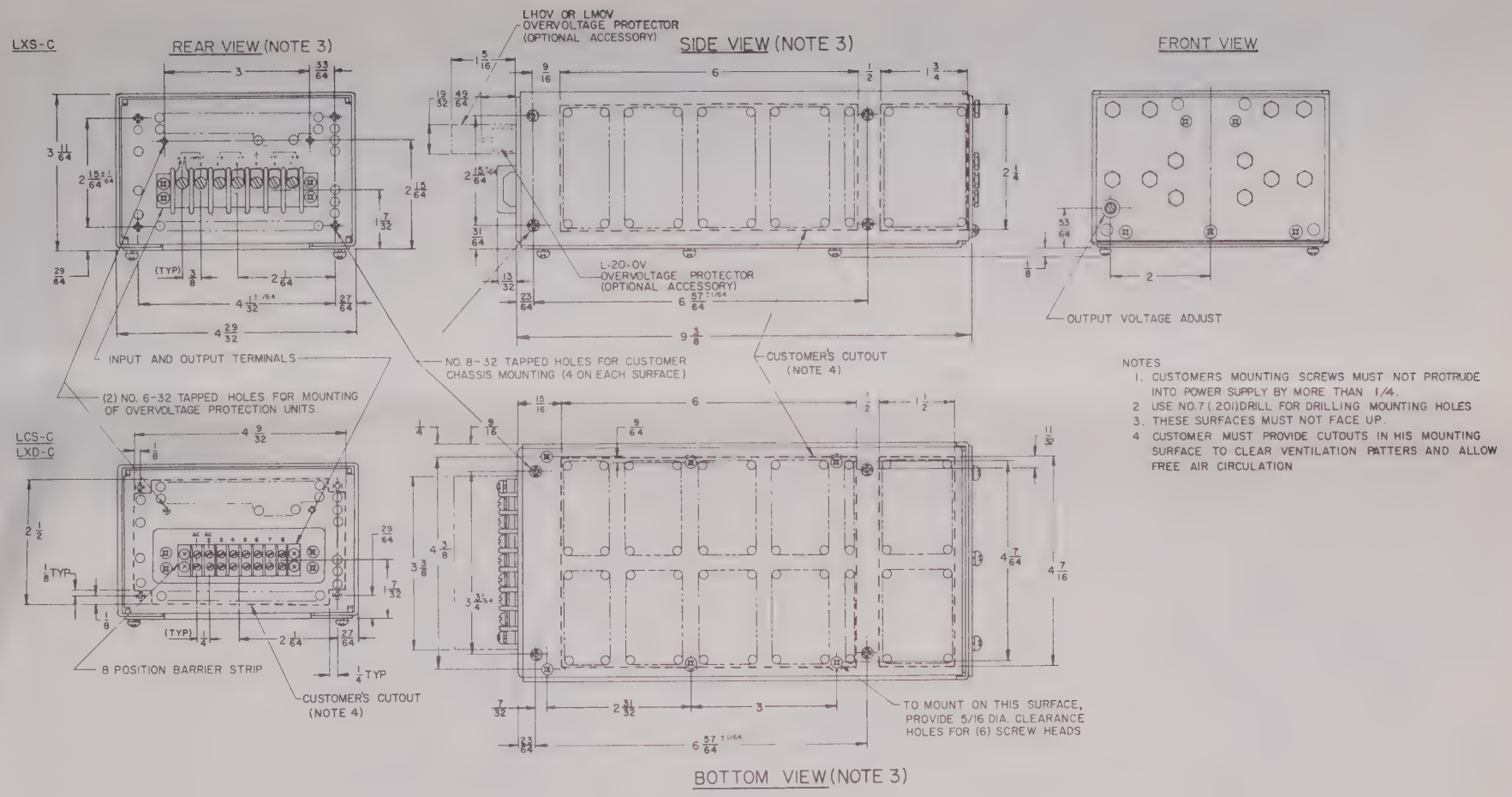
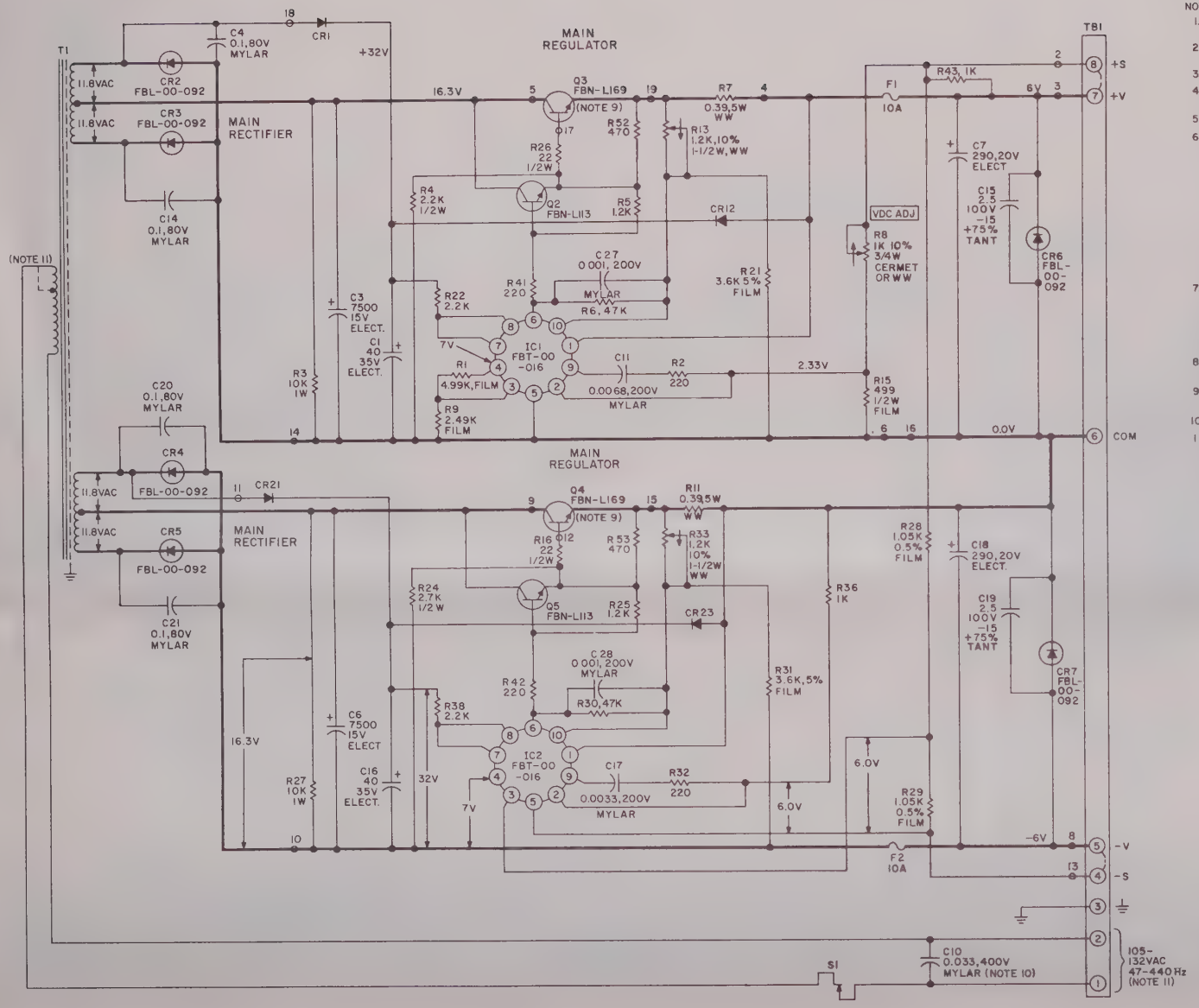

LXS-C
REAR VIEW (NOTE 3)
SIDE VIEW (NOTE 3)
FRONT VIEW
LHOV OR LMOV
OVERVOLTAGE PROTECTOR
(OPTIONAL ACCESSORY)
L-20-OV
OVERVOLTAGE PROTECTOR
(OPTIONAL ACCESSORY)
OUTPUT VOLTAGE ADJUST
INPUT AND OUTPUT TERMINALS
(2) NO. 6-32 TAPPED HOLES FOR MOUNTING
OF OVERVOLTAGE PROTECTION UNITS.
NO. 8-32 TAPPED HOLES FOR CUSTOMER
CHASSIS MOUNTING (4 ON EACH SURFACE)
CUSTOMER'S CUTOUT
(NOTE 4)
LCS-C
LXD-C
8 POSITION BARRIER STRIP
CUSTOMER'S CUTOUT
(NOTE 4)
TO MOUNT ON THIS SURFACE,
PROVIDE 5/16 DIA. CLEARANCE
HOLES FOR (6) SCREW HEADS
BOTTOM VIEW (NOTE 3)
NOTES
1. CUSTOMERS MOUNTING SCREWS MUST NOT PROTRUDE INTO POWER SUPPLY BY MORE THAN 1/4.
2 USE NO.7 (.201) DRILL FOR DRILLING MOUNTING HOLES
3. THESE SURFACES MUST NOT FACE UP.
4 CUSTOMER MUST PROVIDE CUTOUTS IN HIS MOUNTING SURFACE TO CLEAR VENTILATION PATTERS AND ALLOW FREE AIR CIRCULATION

Figure 8. Typical Outline Drawing, LXD-C




NOTES.

1. RESISTORS ARE COMP. 1/4W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.
2. RESISTOR TOLERANCES: COMP. ±10%, FILM ±1%, WIREWOUND ±5%, UNLESS OTHERWISE NOTED.
3. CAPACITOR VALUES ARE IN MICROFARADS.
4. CAPACITOR TOLERANCES: MYLAR ±10%, ELECTROLYTIC -10 +100%.
5. DESIGNATIONS ARE LAMBDA PART NUMBERS.
6. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - LAMBDA PART NO. FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED CIRCUIT BOARD.
   - INDICATES ACTUAL UNIT MARKING.
7. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60 Hz. MAX. RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE D.C. UNLESS OTHERWISE NOTED, D.C. MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM. (TERM 6) AND INDICATED POINTS UNLESS OTHERWISE NOTED.
8. DELETE 40°C RATING FOR 47-53 Hz INPUT, FOR 63-440 Hz INPUT CONSULT FACTORY.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. C10 IS 0.01MF±10%, 1000V, PAPER ON UNITS WITH "V" OPTION.
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIX A, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTIONS.

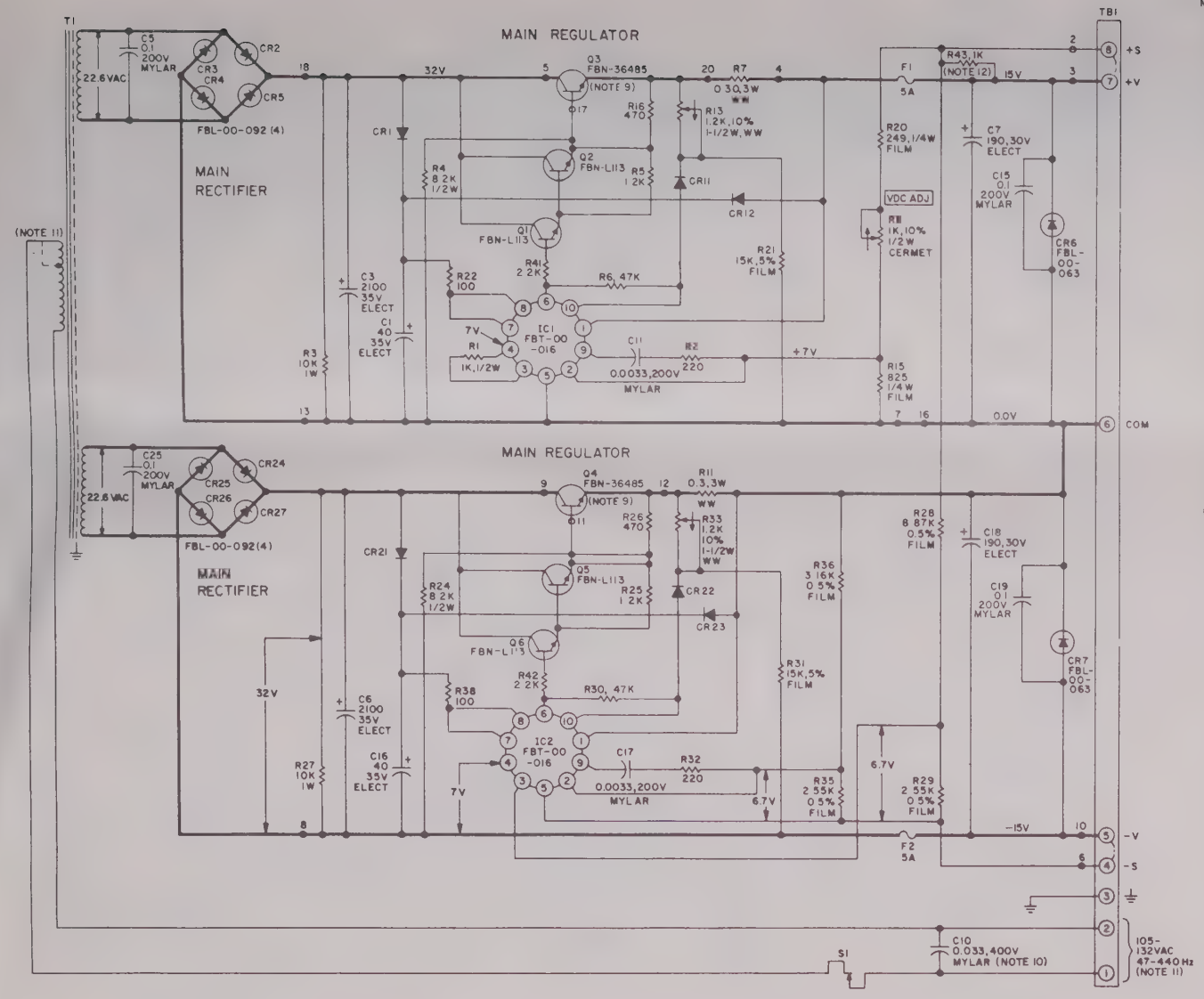
THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES C & D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LXD-B-062

LAMBDA
ELECTRONICS
MELVILLE, NEW YORK

DIVISION OF Veeco INSTRUMENTS INC.




NOTES

1 RESISTORS ARE COMP 1/4W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.

2 RESISTOR TOLERANCES: COMP ±10%, FILM ±1%, WIREWOUND ±5%, UNLESS OTHERWISE NOTED.

3 CAPACITOR VALUES ARE IN MICROFARADS

4 CAPACITOR TOLERANCES: MYLAR ±10%, ELECTROLYTIC -10 +100 %

5 DESIGNATIONS ARE LAMBDA PART NUMBERS.

6 SYMBOLS

- INDICATES CLOCKWISE ROTATION OF SHAFT.
- INDICATES CONNECTION TO CHASSIS.
- LAMBDA PART NO. FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
- INDICATES TERMINAL ON PRINTED CIRCUIT BOARD.
- INDICATES ACTUAL UNIT MARKING.

7 CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT 115VAC, 60 Hz MAX RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE D.C. UNLESS OTHERWISE NOTED, D.C MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM. (TERM 6) AND INDICATED POINTS UNLESS OTHERWISE NOTED

8 DELETE 40°C RATING FOR 47-53 Hz INPUT, FOR 63-440 Hz INPUT CONSULT FACTORY.

9 COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO 340 SILICONE GREASE

10 C10 IS 0.01MF±10%, 1000V, PAPER ON UNITS WITH "V" OPTION.

11 ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIX A, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.

12 R43 IS NOT USED ON UNITS WITH SERIAL NO. PREFIX A

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTIONS.

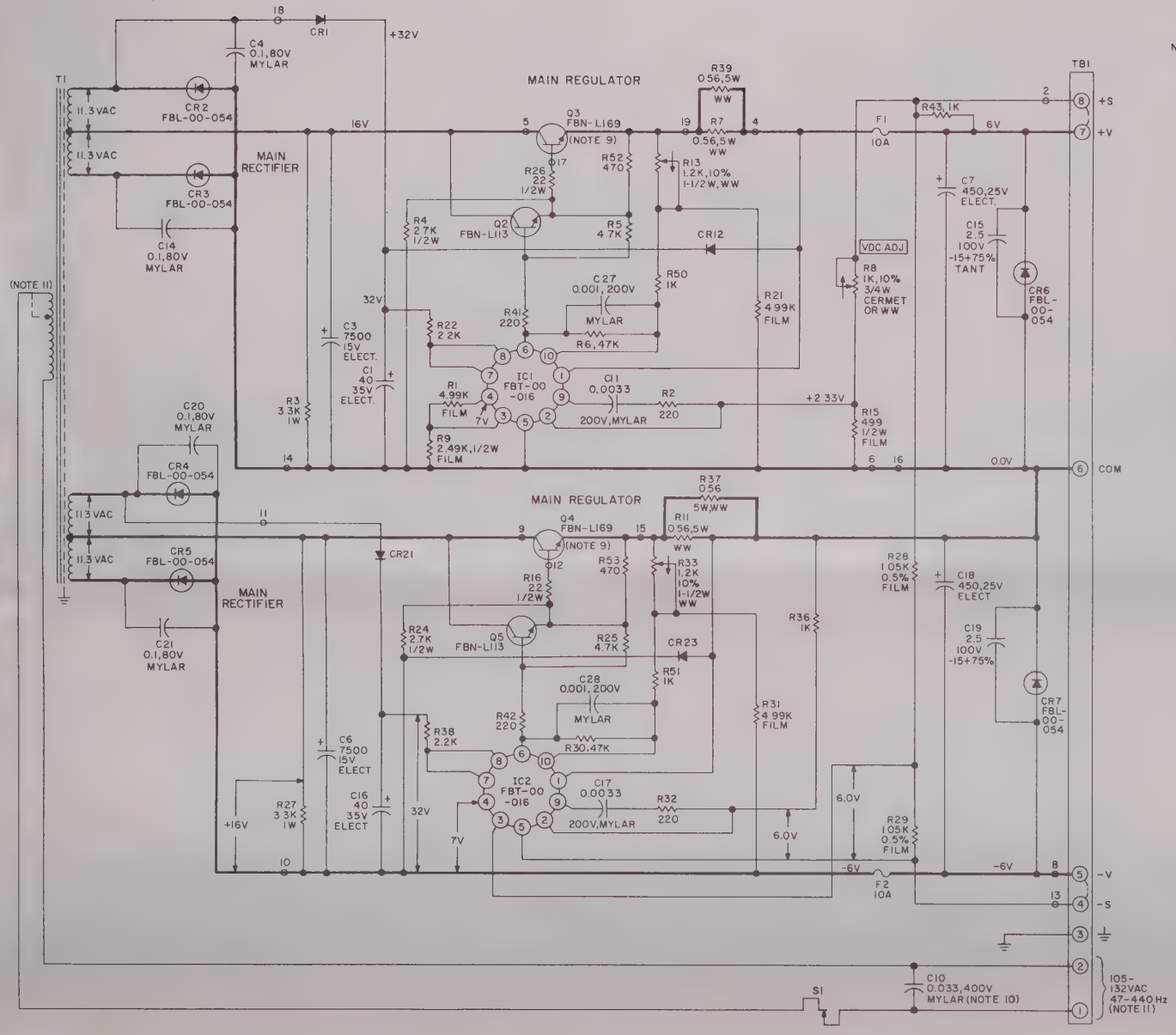
THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES ABB

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LXD-B-152

LAMBDA
ELECTRONICS
MELVILLE, NEW YORK

DIVISION OF Veeco INSTRUMENTS INC.




NOTES:

1. RESISTORS ARE COMP. 1/4W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.
2. RESISTOR TOLERANCES: COMP. ±10%, FILM ±1%, WIREWOUND ±5%, UNLESS OTHERWISE NOTED.
3. CAPACITOR VALUES ARE IN MICROFARADS
4. CAPACITOR TOLERANCES: MYLAR ±10%, ELECTROLYTIC -10 +100%.
5. DESIGNATIONS ARE LAMBDA PART NUMBERS
6. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS
   - LAMBDA PART NO. FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED
   - INDICATES TERMINAL ON PRINTED CIRCUIT BOARD.
   - INDICATES ACTUAL UNIT MARKING.
7. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS. INPUT: 115VAC, 60 Hz, MAX. RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE D.C UNLESS OTHERWISE NOTED, D.C MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM. (TERM 6) AND INDICATED POINTS UNLESS OTHERWISE NOTED.
8. DELETE 40°C RATING FOR 47-53 Hz INPUT, FOR 63-440 Hz INPUT CONSULT FACTORY.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO 340 SILICONE GREASE.
10. C10 IS 0.01MF±10%, 1000V, PAPER ON UNITS WITH "V" OPTION.
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIX A, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTIONS.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES C8D

# SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LXD-C-062

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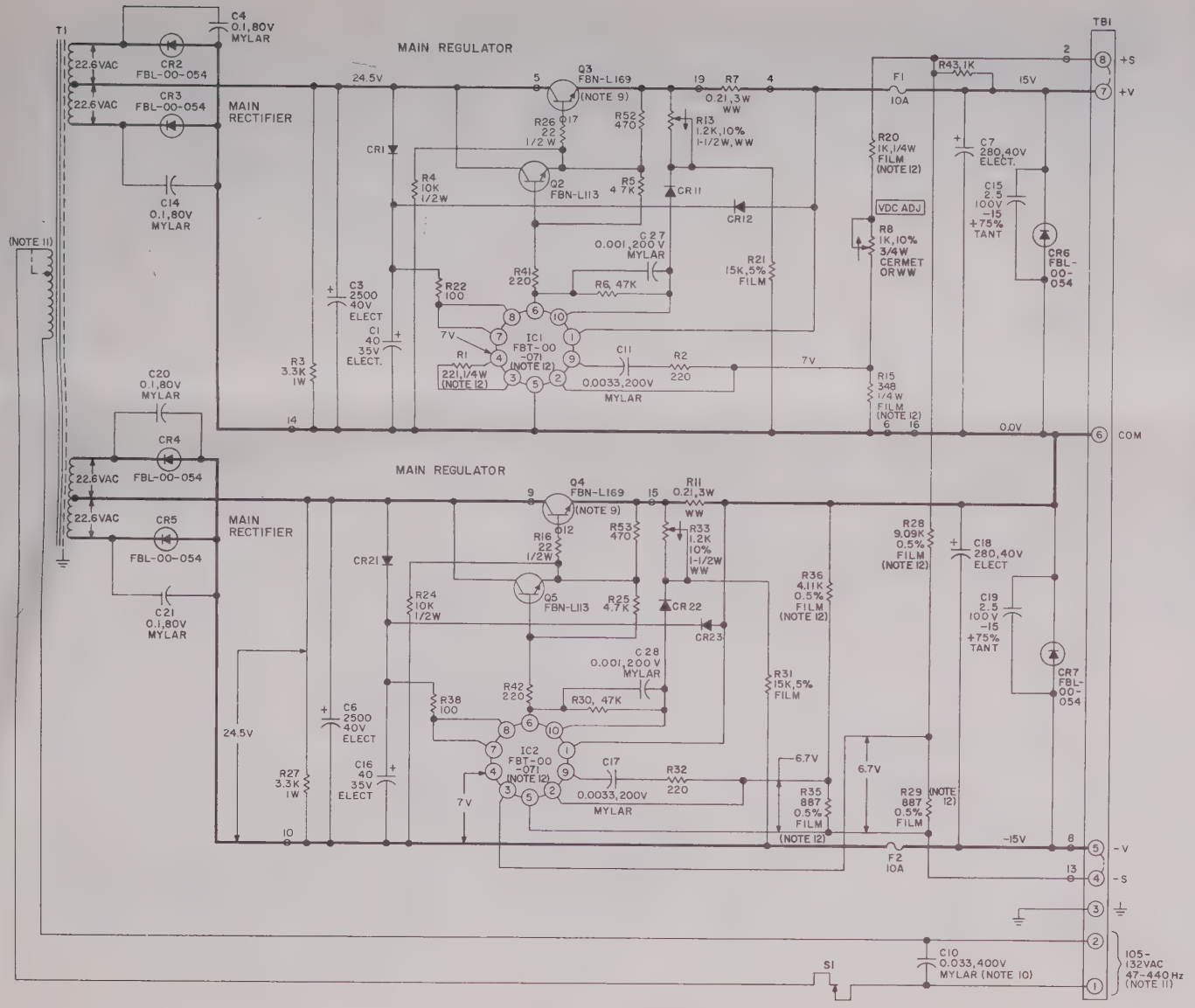


NOTES.

1. RESISTORS ARE COMP. 1/4W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.
2. RESISTOR TOLERANCES: COMP. ±10%, FILM ±1%, WIREWOUND ±5%, UNLESS OTHERWISE NOTED.
3. CAPACITOR VALUES ARE IN MICROFARADS
4. CAPACITOR TOLERANCES: MYLAR ±10%, ELECTROLYTIC -10 +100%.
5. DESIGNATIONS ARE LAMBDA PART NUMBERS.
6. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - LAMBDA PART NO. FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED CIRCUIT BOARD.
   - INDICATES ACTUAL UNIT MARKING.
7. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60 Hz. MAX. RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE D.C. UNLESS OTHERWISE NOTED, D.C. MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM. (TERM 6) AND INDICATED POINTS UNLESS OTHERWISE NOTED.
8. DELETE 40°C RATING FOR 47-53 Hz INPUT, FOR 63-440 Hz INPUT CONSULT FACTORY
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. C10 IS 0.01MF±10%, 1000V, PAPER ON UNITS WITH "V" OPTION.
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIX A, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V
12. ON UNITS WITH SERIAL NO. PREFIX C, R1 IS 1K, 1/2W COMP, R15 IS 825, R20 IS 1K, R28 IS 8.87K, R29 & R35 ARE 2.55K, R36 IS 3.16K AND IC1 AND IC2 ARE FBT-00-016.

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTIONS.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES C&D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LXD-C-152

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ELECTRONICS
MELVILLE, NEW YORK

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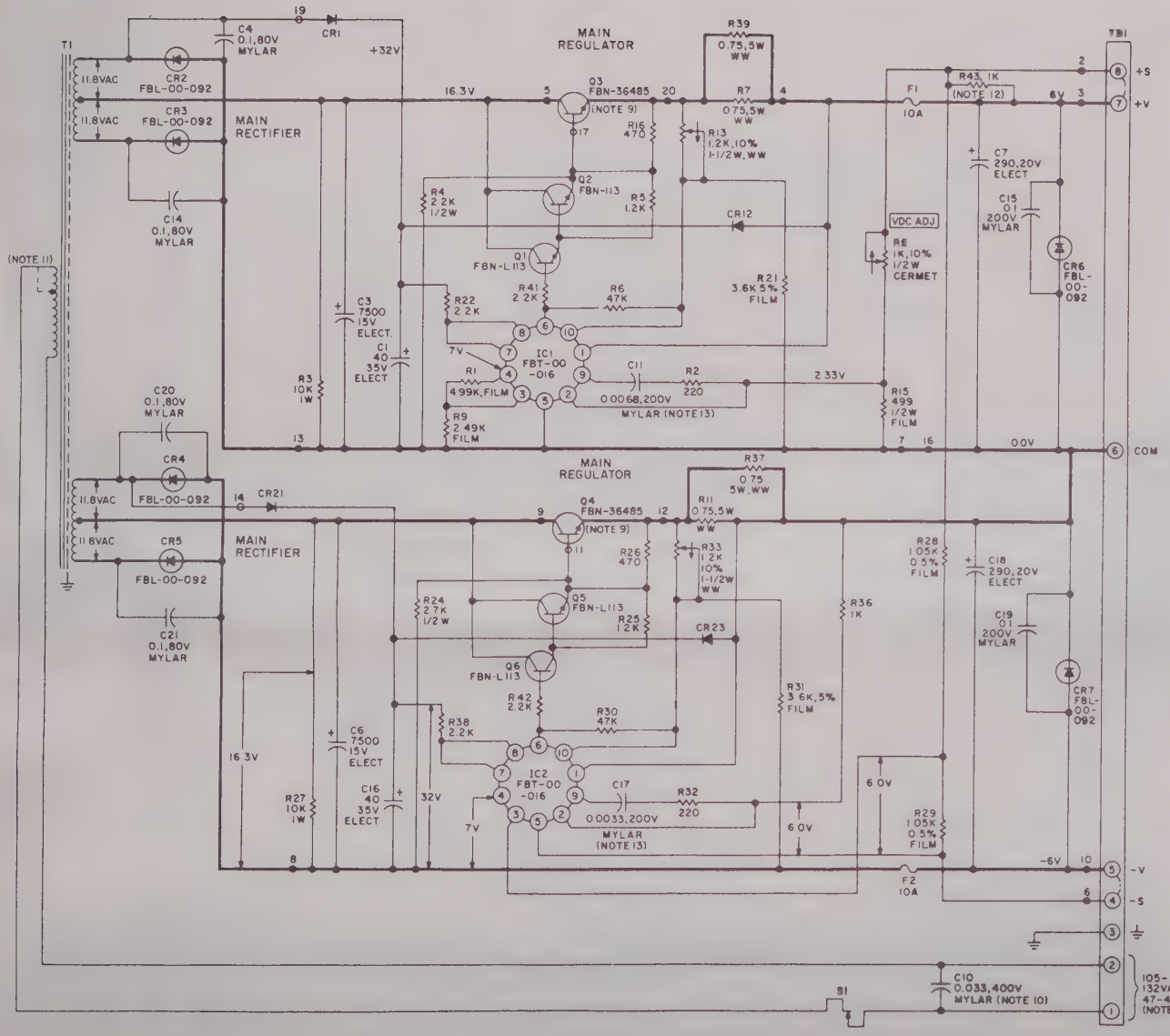


NOTES

1. RESISTORS ARE COMP. 1/4W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.
2. RESISTOR TOLERANCES: COMP. ±10%, FILM ±1%, WIREWOUND ±5%, UNLESS OTHERWISE NOTED.
3. CAPACITOR VALUES ARE IN MICROFARADS
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5. DESIGNATIONS ARE LAMBDA PART NUMBERS.
6. SYMBOLS
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - LAMBDA PART NO. FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED CIRCUIT BOARD.
   - INDICATES ACTUAL UNIT MARKING.
7. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60 Hz MAX RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE D.C. UNLESS OTHERWISE NOTED, D.C MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM. (TERM 6) AND INDICATED POINTS UNLESS OTHERWISE NOTED
8. DELETE 40°C RATING FOR 47-53 Hz INPUT, FOR 63-440 Hz INPUT CONSULT FACTORY.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO 340 SILICONE GREASE
10. C10 IS 0.01MF±10%, 1000V, PAPER ON UNITS WITH "V" OPTION.
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY, "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIX A, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V
12. R43 IS NOT USED ON UNITS WITH SERIAL NO. PREFIX A.

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTIONS.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A&B

# SCHEMATIC DIAGRAM
## REGULATED POWER SUPPLY

LXD-B-062

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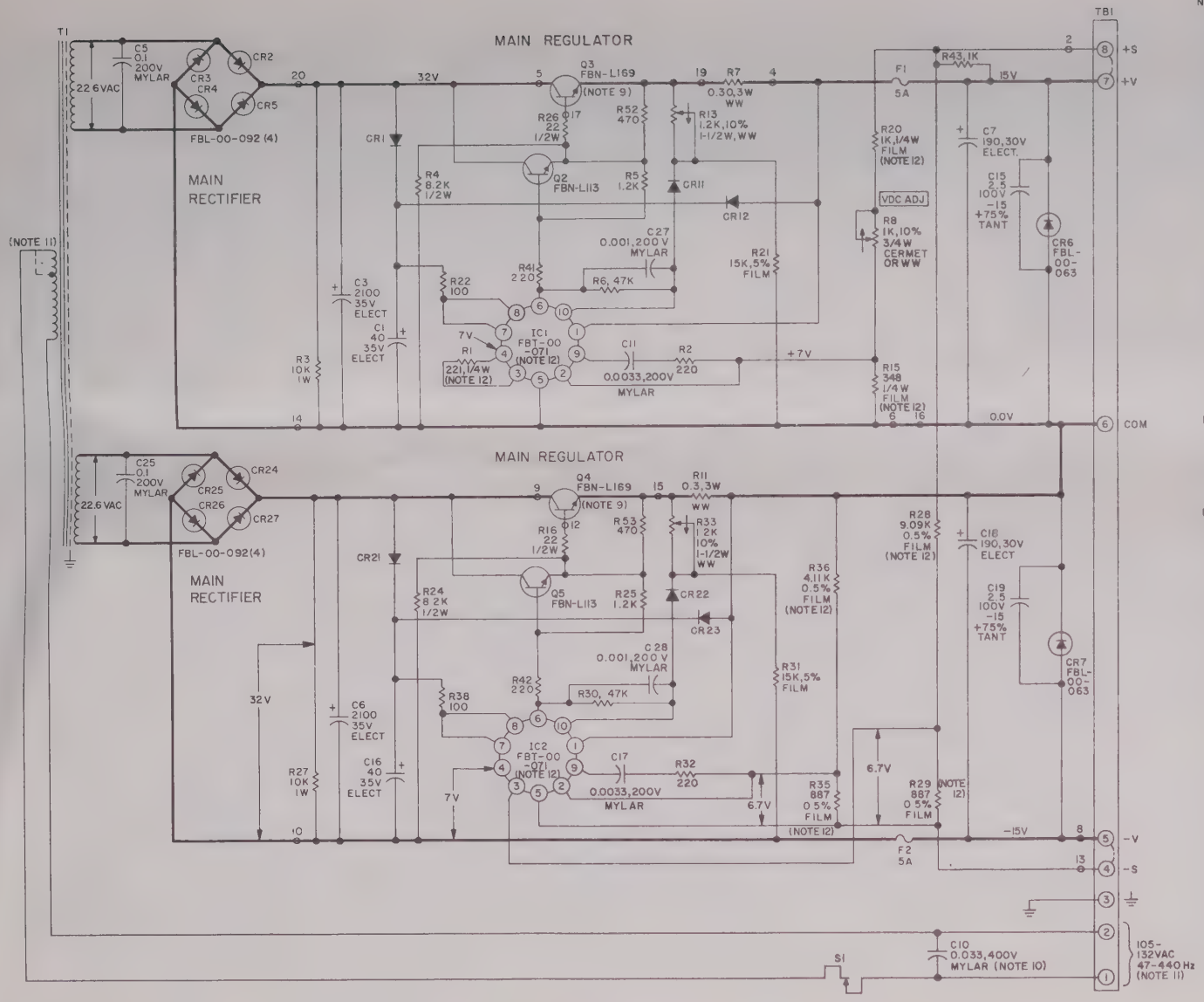


NOTES

1. RESISTORS ARE COMP 1/4W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.
2. RESISTOR TOLERANCES: COMP. ±10%, FILM ±1%, WIREWOUND ±5%, UNLESS OTHERWISE NOTED.
3. CAPACITOR VALUES ARE IN MICROFARADS.
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6. SYMBOLS:
   - ↑ INDICATES CLOCKWISE ROTATION OF SHAFT.
   - ⏚ INDICATES CONNECTION TO CHASSIS.
   - ▶| LAMBDA PART NO. FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - —o— INDICATES TERMINAL ON PRINTED CIRCUIT BOARD.
   - ▭ INDICATES ACTUAL UNIT MARKING.
7. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60 Hz. MAX. RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE D.C. UNLESS OTHERWISE NOTED, D.C MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM. (TERM 6) AND INDICATED POINTS UNLESS OTHERWISE NOTED
8. DELETE 40°C RATING FOR 47-53 Hz INPUT, FOR 63-440 Hz INPUT CONSULT FACTORY
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE
10. C10 IS 0.01MF±10%, 1000V, PAPER ON UNITS WITH "V" OPTION
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIX A, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
12. ON UNITS WITH SERIAL NO. PREFIX C, R1 IS 1K 1/2W COMP, R15 IS 825, R20 IS 1K, R28 IS 8.87K, R29 AND R35 ARE 2.55K, R36 IS 3.16K AND IC1 AND IC2 ARE FBT-00-016.

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTIONS.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES C&D

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LXD-B-152

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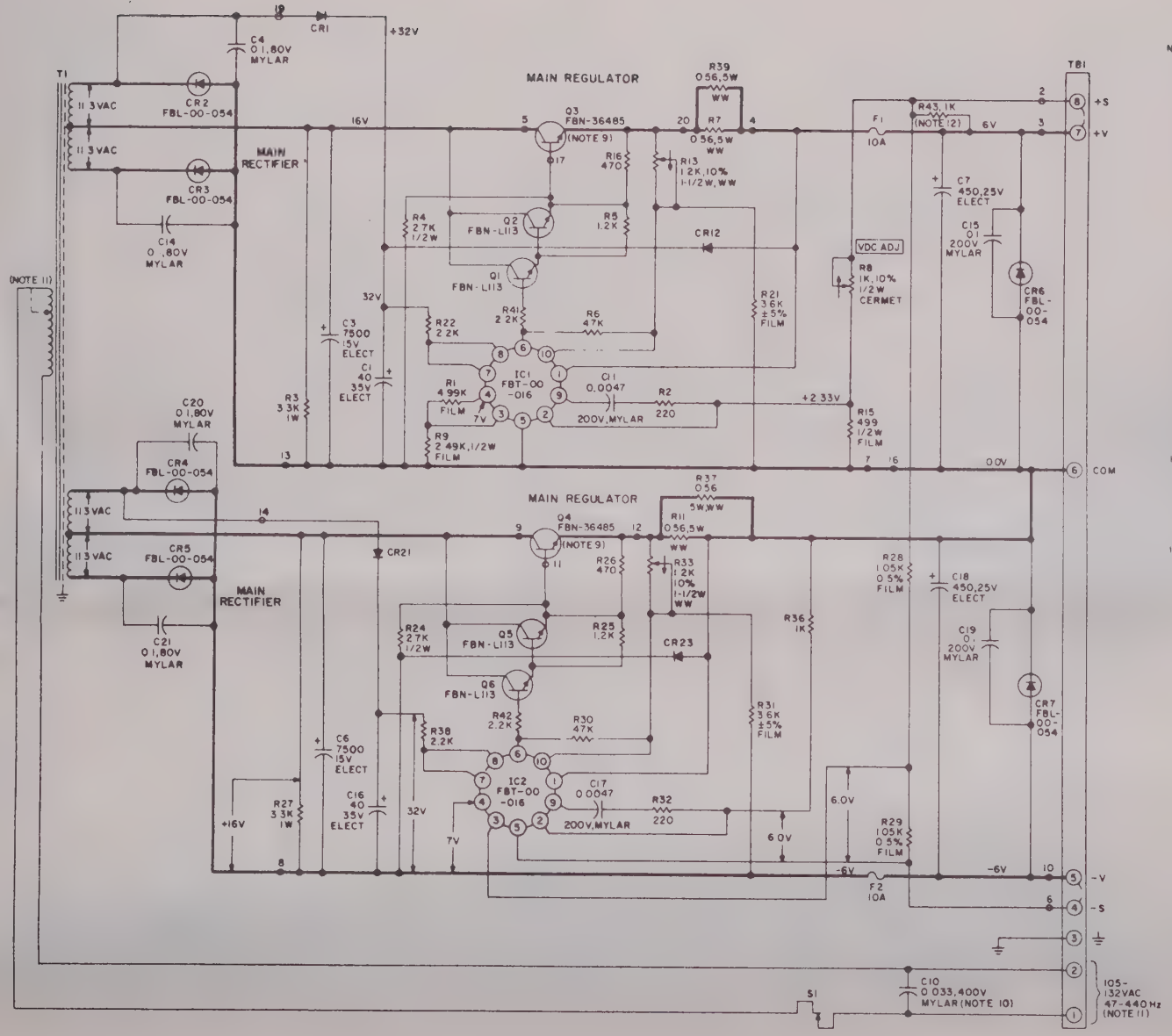


NOTES

1. RESISTORS ARE COMP. 1/4W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.
2. RESISTOR TOLERANCES COMP ±10%, FILM ±1%, WIREWOUND ±5%, UNLESS OTHERWISE NOTED
3. CAPACITOR VALUES ARE IN MICROFARADS
4. CAPACITOR TOLERANCES MYLAR ±10%, ELECTROLYTIC -10 +100 %
5. DESIGNATIONS ARE LAMBDA PART NUMBERS
6. SYMBOLS
   - INDICATES CLOCKWISE ROTATION OF SHAFT
   - INDICATES CONNECTION TO CHASSIS
   - LAMBDA PART NO. FBL-00-030, USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED
   - INDICATES TERMINAL ON PRINTED CIRCUIT BOARD.
   - INDICATES ACTUAL UNIT MARKING
7. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS INPUT 115VAC, 60 Hz MAX RATED VOLTAGE NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED, DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM (TERM 6) AND INDICATED POINTS UNLESS OTHERWISE NOTED
8. DELETE 40°C RATING FOR 47-53 Hz INPUT, FOR 63-440 Hz INPUT CONSULT FACTORY
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO 340 SILICONE GREASE
10. C10 IS 0.01MF±10%, 1000V, PAPER ON UNITS WITH "V" OPTION
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY) ON SERIAL NO PREFIX A, "V" OPTION UNITS; T1 PRIMARY IS NOT TAPPED AC INPUT IS 205-265V
12. R43 IS NOT USED ON UNITS WITH SERIAL NO PREFIX A

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTIONS.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO PREFIXES A&B

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LXD-C-062

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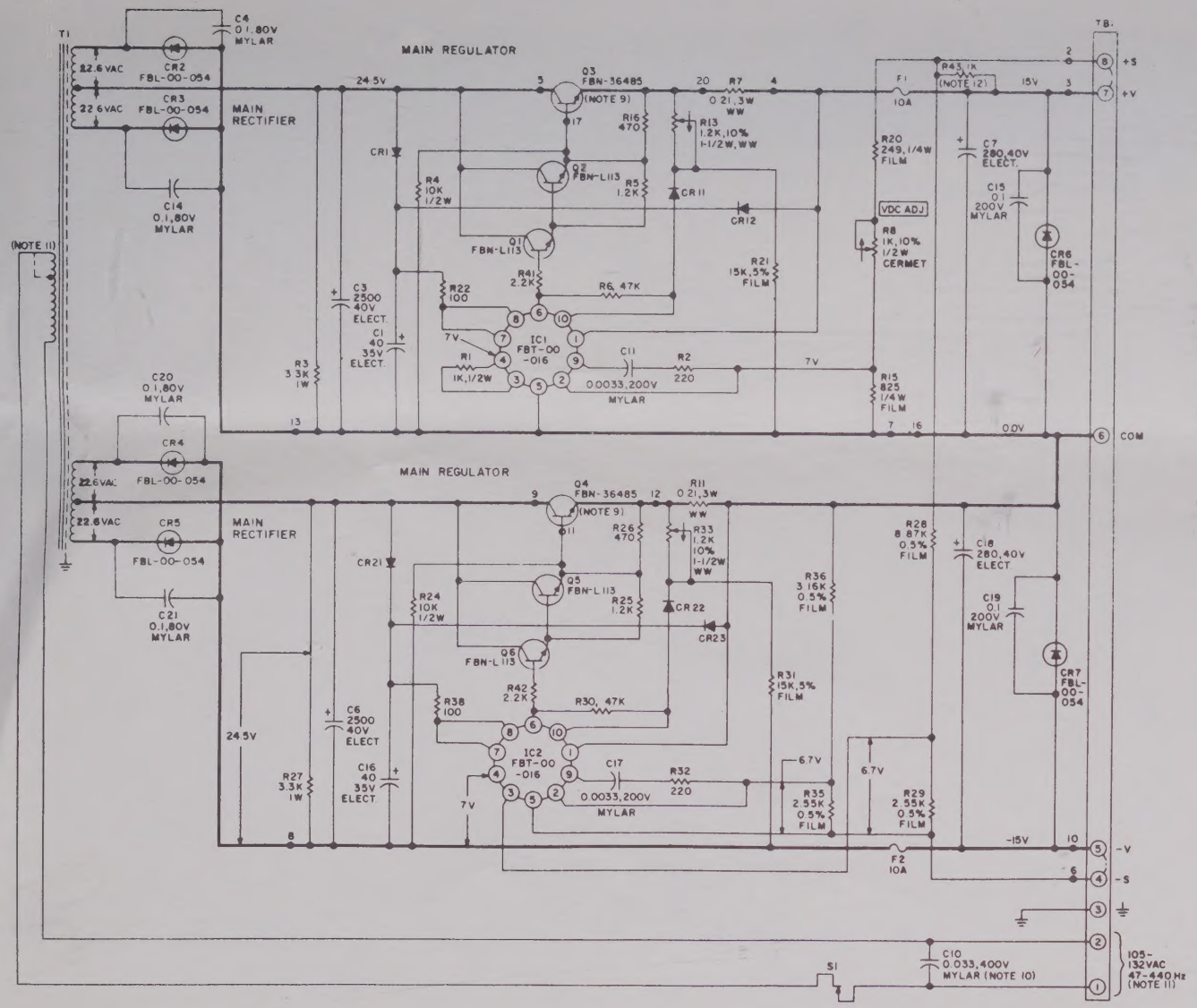


NOTES

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8. DELETE 40°C RATING FOR 47-53 Hz INPUT, FOR 63-440 Hz INPUT CONSULT FACTORY.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. C10 IS 0.01MF±10%, 1000V, PAPER ON UNITS WITH "V" OPTION.
11. ON UNITS WITH "V" OPTION, T1 HAS TAPPED PRIMARY. "V" OPTION UNITS CAN BE WIRED FOR 187-242V INPUT (USING TAP), OR FOR 205-265V INPUT (USING ENTIRE PRIMARY). ON SERIAL NO. PREFIX A, "V" OPTION UNITS, T1 PRIMARY IS NOT TAPPED. AC INPUT IS 205-265V.
12. R43 IS NOT USED ON UNITS WITH SERIAL NO. PREFIX A.

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTIONS.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A&B

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LXD-C-152

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ELECTRONICS
MELVILLE, NEW YORK

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# 5-Year Guarantee

We warrant each instrument manufactured by us, and sold by us or our authorized agents, to be free from defects in material and workmanship, and that it will perform within applicable specifications for a period of five years after original shipment. Our obligation under this guarantee is limited to repairing or replacing any instrument or part thereof, (except tubes and fuses) which shall, within five years after delivery to the original purchaser, be returned to us with transportation charges prepaid, prove after our examination to be thus defective.

We reserve the right to discontinue instruments without notice, and to make modifications in design at any time without incurring any obligation to make such modifications to instruments previously sold.


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